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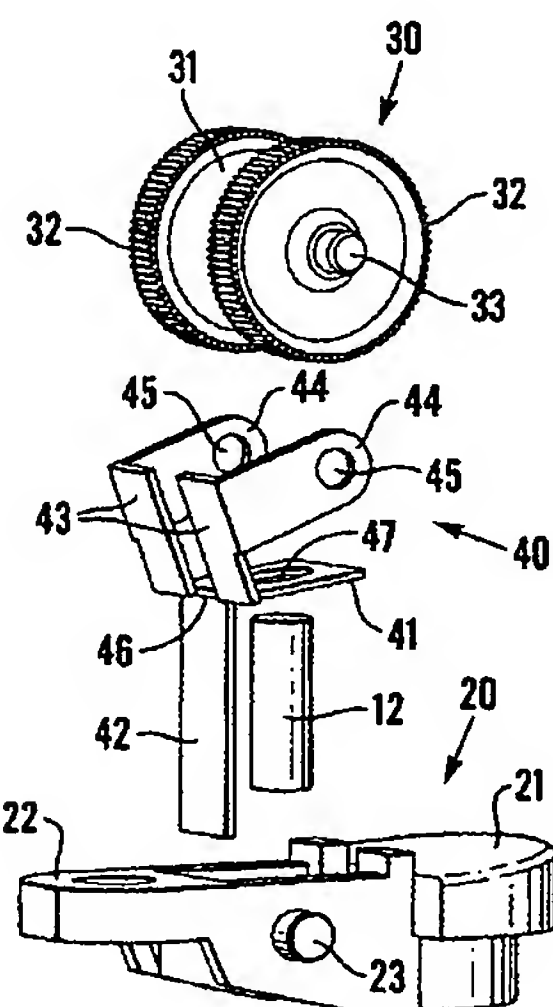
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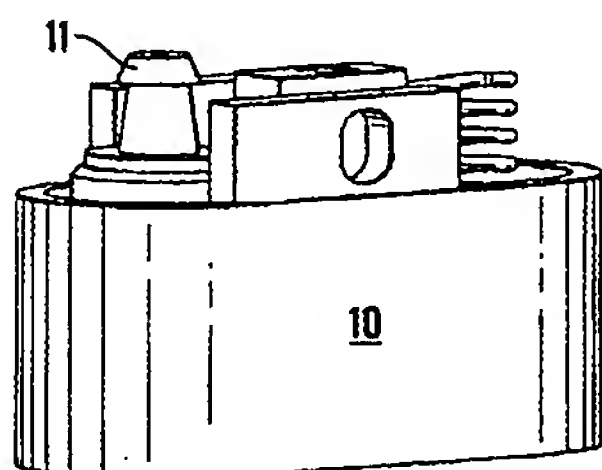
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(54) Title: CHILD-RESISTANT GAS LIGHTERS



(57) Abstract: A gas lighter of the roll and press type, with a spark generator comprising a spark-wheel assembly (30) and a flint (12) mounted centrally at the top of the lighter, a burner (11) mounted to one side of the spark generator, and a gas release lever (20) extending from the burner to an operating portion on the opposite side of the spark generator. In a first position of non use of the lighter, the flint is positioned below the spark wheel such that no or insufficient sparks are produced to ignite the lighter. For use, the flint is urged into a second position against the spark wheel so that sufficient sparks to ignite the lighter are generated when the spark wheel is rotated.



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## Child-Resistant Gas Lighters

5           The present invention relates to gas lighters of the roll and press type, and more specifically to child-resistant lighters.

Gas lighters, of the type used for lighting cigarettes, are well known. A lighter of this type has a gas reservoir, a gas regulation system, a valve  
10 open/close system lifted and closed by a lever, and an ignition mechanism. The ignition mechanism preferably comprises a spark-wheel disposed midway between two thumb-wheels whose diameter is larger than the spark-wheel. The spark-wheel rubs frictionally against a flint when rotated, in order to project sparks above the opened burner and therefore to produce a  
15 flame.

It is important to prevent the use of such lighters by children under the age of 5 years. Since 1992, the CPSC Rules & Regulations have specified the test for whether a lighter is child-resistant.

20

Many child-resistant lighter mechanisms have been proposed. There are two broad ways of making a lighter child-resistant. Most systems use a blocking mechanism having two positions; one where the mechanism is prevented from working (the lighter cannot function properly), and another  
25 where the mechanism is manipulated (by displacement, pivoting, etc) to a position where the lighter can function and produce a flame. This mechanism reset automatically to its original position after one function of the lighter. In the other type of mechanism, the unlocking system is in the spark-wheel area in order to minimize the time the user takes to learn how to

operate it. Usually, these systems do not use purely mechanical interlocking means as described above, but rather involve properties or parts which make the operation difficult for children while still easy to operate by adults.

5           There are numerous examples of this kind of mechanism. One such example is US-A-5490773 assigned to Flamagas SA. In this Flamagas patent, the ignition system when used in a normal manner is brought in a recess area where the spark-wheel blocks on the flint or on the flint tube and thereby prevent any rotation of the ignition system. It is in fact necessary to  
10   move it forwards in a recess in order that the blocking of the spark-wheel is de-activated. Such systems need accurate tolerances and are easily overridden by forcing the rotation of the ignition system. Furthermore, the operation of this ignition system is not totally intuitive as it needs the user to learn that the rotation is achieved only if an initial movement of the ignition  
15   system to the front of the lighter is performed, before the rotation. The system has a mechanism which blocks the flint by means of a spring or otherwise, in a position where it does not touch the spark-wheel. The spark-wheel must be pushed downwards, sideways or to the front to make contact with the flint.

20

The object of the invention is to provide an improved child-resistant lighter.

According to the invention there is provided a gas lighter of the roll  
25   and press type, comprising a spark generator comprising a spark-wheel assembly and a flint mounted centrally at the top of the lighter, a burner mounted to one side of the spark generator, and a gas release lever extending from the burner to an operating portion on the opposite side of the spark generator, wherein the spark-wheel assembly is mounted for inwards and

outwards movement and urged to its out position, and including flint holding means which normally grip the flint but release the flint in response to a downward force resulting from operation of the lighter.

5           The flint holding means may be released by either the inward movement of the spark-wheel assembly or the lever.

          In its preferred forms, the present invention provides lighters which can readily be operated without the user having to learn how, which are  
10   difficult for children to operate, and in which operation by incorrect techniques is difficult or impossible.

          Three embodiments of the invention will now be described by way of example and with reference to the drawings, in which:

15           Figs. 1A and 1B show the first lighter in perspective and exploded forms;

          Figs. 2A and 2B are sections through the first lighter in the rest and operated states;

20           Figs. 3A and 3B show the second lighter in perspective and exploded forms;

          Figs. 4A and 4B are sections through the second lighter in the rest and operated states;

          Fig. 5 shows the third lighter in exploded form; and

          Figs. 6A and 6B are parallel sections through the third lighter.

25

          Referring to Figs. 1A and 1B, the first lighter comprises a body 10, a lever 20, a wheel assembly 30, and a wheel assembly support element 40.

The body 10 contains a gas supply with a jet or burner outlet 11. The body also contains a flint 12 which is spring-loaded by a spring 13 (shown in Figs. 2A and 2B). The lever 20 comprises an operating end 21, a gas control end 22, and stub pivot shafts 23 which engage with the body 10. The wheel assembly 30 comprises a spark-wheel 31, a pair of thumb-wheels 32 on either side of the spark-wheel and of slightly larger diameter than the spark-wheel, all mounted on a shaft 33. The support element 40 comprises a plate 41 with a downward leg 42 which engages with the body 10 and holds the support element in the body, and a pair of upward arms 43 with side extensions 44 having holes 45 in which the shaft 33 of the wheel assembly 30 engages.

As described so far, the lighter operates broadly conventionally. To use the lighter, the user places their thumb on the wheel assembly 30 and presses down and to the right. This causes the wheel assembly to rotate, with the spark-wheel 31 rubbing against the flint 12 and producing sparks which fly off to the left. The user's thumb then falls on the operating end 21 of the lever 20, depressing it and raising its other end 22. This opens the gas jet 11, and gas escaping through it is ignited by the sparks from the flint. The flame will continue until the user releases the lighter by removing their thumb from the operating end 21 of the lever 20; the lever then returns, under spring-loading, to its original position, with its end 22 dropping and closing the gas burner 11.

More specifically, however, the wheel assembly 30 is supported on the support element 40, which is normally in the position shown in Figs. 1A, 1B, and 2A, in which the plate 41 is tilted slightly upwards. This plate is resiliently attached to the leg 42 along an angular bend 46. If the wheel assembly 30 is pressed downwards, the force is transmitted to the plate 41 via the arms 43 and their side extensions 44, and this will cause the plate 41 to

rotate slightly about its join with the leg 42. The plate 41 will therefore adopt a less tilted position, as shown in Fig. 1B.

5 The plate 46 has a hole 47 in it, through which the flint 12 passes. When the plate 41 is horizontal, as shown in Fig. 2B, there is a clearance between the flint 12 and the hole 47. The flint 12 is therefore urged upwards by the spring 13 against the spark-wheel 31. This will occur when the user uses the lighter, pressing the wheel assembly downwards.

10 The pressure on the wheel assembly 30 will be released when the user's thumb slides off the wheel assembly 30 (or possibly when they lift their thumb from the lever 20). The resilience of the support element 40 will then result in the plate 41 tilting upwards again about the line 46 where it meets the leg 42. This will raise the wheel assembly back to its initial position.

15 The flint 12 is pressed against the spark-wheel 31 by the spring 13. So as the wheel assembly rises, the flint 12 will also tend to rise. However, as the plate 41 tilts, the hole 47 will become skewed, and will engage with the flint 12. This will prevent the flint from rising any further. As a result, the  
20 wheel assembly 30 will rise away from the flint.

In this description of this and the other embodiments the rise and fall and upwards and downwards movement of the spark wheel assembly is referred to. It will be appreciated that the movement of the spark wheel  
25 assembly to release the flint may be constrained to move inwards and outwards in an angled way with respect to the axis of the lighter. This resulting inwards and outwards movement has essentially the same effect.



If a child plays with the lighter, they may be able to turn the wheel assembly. But with the wheel assembly in the raised position, it will rotate freely without contacting the flint and without producing any sparks. It is only if sufficient pressure is applied to force the wheel assembly downwards  
5 that sparks will be produced. So even if the child's finger or thumb slides down over the wheel assembly and they press on the operating end 21 of the lever 20 and open the gas jet 11, the lighter will remain unlit because no sparks will have been produced.

10 In addition to the resilience between the plate 41 and the leg 42, there is a similar resilience between the plate 41 and the arms 43, along the extension of the angular bends forming extensions of the line of the bend 46. Pressing the wheel assembly downwards will therefore result in the arms 43 bending to the right relative to the plate 41, as well as the tilt of the plate 41  
15 being reduced. As the downward pressure of the wheel assembly is removed, so the tilting of the plate 41 is limited by its engagement with the flint 12, which prevents further tilting. The support element 40 is preferably designed so that these resiliences result in the wheel assembly 30 continuing to rise after the flint engages with the plate 41, resulting in a positive separation of  
20 the flint from the spark-wheel.

The fact that the flint is released when the lighter is operated correctly means that it can rise as it is worn away, and will always contact the spark-wheel when the lighter is used correctly.

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Figs. 3A and 3B show the second lighter. This resembles the first lighter, and corresponding parts are given corresponding references. Thus this lighter comprises a body 10, a lever 20, and a wheel assembly 30. Instead of the wheel assembly support element 40, however, this lighter has a



flint engagement element 50, described in detail below. Further, the body 10 has a pair of extensions 18 rising from its sides. In the upper parts of the extensions 18 there is a pair of apertures 15 in which the shaft 33 is carried. The extensions 18 have slots 14 below the holes 15, and the narrow portions 16 of the extensions at the ends of the slots 14 provide resilience, allowing the wheel assembly 30 to be pressed downwards but returning it to its initial position when the pressure is released.

Figs. 4A and 4B show the lighter on a larger scale, in its rest and operating positions. It should be noted that a circular part of the extension 18 is omitted, to show the structures behind it.

The flint engagement element 50 comprises a horizontal base plate 51 having two arms 52 and 54 upstanding from it. At the top end of arm 54 there is a horizontal top plate 51a with a hole 56 and having two prongs 55 extending from it. The base plate 51 is located inside the body 10 of the lighter, with the arms 52 and 54 extending upwards on either side of the flint 12; base plate 51 and arm 52 effectively hold the element 50 in position. The top plate 51a of the element 50 extends just below the wheel assembly 30, and the flint 12 protrudes through the hole 56.

The prongs 55 engage with the tips 17 of the upper parts of the body extensions 18. When the lighter is operated, the user presses the wheel assembly 30 downwards. This presses the upper parts of the body extensions 18 downwards, and their tips 17 press against the prongs 55 and so force the top plate 51a of element 50 to the horizontal position, as shown in Fig. 4B; top plate 51a effectively hinges about the line joining it to the arm 54. In this position, the flint 12 passes freely through the hole 56, and engages with the spark-wheel 31. When the pressure on the wheel assembly is released, the

wheel assembly is returned to the upper position, as shown in Fig. 4A. The resilience of the element 50 causes the plate 51a to rotate back to the tilted position shown in Fig. 4A. This results in the right-hand edge 57 of the hole 56 engaging with the flint 12 and preventing the flint from rising with the wheel assembly; the flint is prevented from moving to the left by its engagement with the left-hand edge 19 of the body channel in which it is located.

As a result, the flint is held in a position below the spark-wheel 31 when the lighter is in the relaxed position of Fig. 4A. In this position, the wheel assembly can be rotated without engaging with the flint and so not producing any sparks. It is only when the wheel assembly is depressed (and the lever 20 operated) that sparks can be generated and the lighter lit.

Fig. 5 shows the third lighter. This resembles the first lighter, and corresponding parts are given corresponding references. Thus this lighter comprises a body 10, a lever 20, and a wheel assembly 30. Instead of the wheel assembly support element 40, however, this lighter has a leaf spring 60 which co-operates with flint engagement means in the body 10, described in detail below. Further, the body 10 has a pair of extensions 64 rising from its sides. These have holes 65 in which the wheel assembly is mounted; the holes are elongated vertically, as will be discussed below.

The body 10 has two upwardly extending elements 62 and 63 which have a channel between them in which the flint 12 is located, as shown in Fig. 5; these elements are resilient so that they can be moved slightly apart and together. The leaf spring 60 is clipped over their upper ends, so as to normally urge them together; the spring 60 has a hole 61 through which the flint 12 can pass freely at all times.

Fig. 6B is a central section through the lighter, and shows the flint 12 between the two elements 62 and 63. Fig. 6A is a parallel section closer to the side face of the lighter. The lever 20 has a pair of projections 24, one on each side, and these projections are located between the upper ends of the elements 62 and 63, as shown in Fig. 6A; these elements are sloped in the region of the projections 24, as is also shown in Fig. 6A.

Normally, the projections 24 are in the upper position, and the elements 62 and 63 are urged together by the spring 60 to grip the flint 12. When the lever 20 is pressed, the elongated hole 65 allows it to move downwards, pivoting about its left-hand end (at the burner 11). This moves the projections 24 downwards between the elements 62 and 63, forcing these elements apart against the spring 60, and thereby releasing the flint 12. Further pressure on the lever 20 causes it to continue to turn. With its stub pivot shafts 23 now at the bottom of the holes 65, this results in the gas valve 11 being opened in the usual way.

It will be noted that in this lighter, the wheel assembly 30 is carried on the lever 20; specifically, its axle 33 is mounted in holes 26 in upward extensions 25 on the lever 20. The initial downward movement of the lever 20 therefore carries the wheel assembly downwards before the flint 12 is released from the elements 62 and 63; similarly, the final upwards movement of the lever 20 when it is released carries the wheel assembly away from the position in which the flint is gripped and held. Further, the initial downward pressure on the lever 20 is produced by the pressure on the wheel assembly, so the flint is released and brought into contact with the spark-wheel while the wheel assembly is being turned.

### Claims

- 5     1     A gas lighter of the roll and press type, comprising a spark generator comprising a spark-wheel assembly and a flint mounted centrally at the top of the lighter, a burner mounted to one side of the spark generator, and a gas release lever extending from the burner to an operating portion on the opposite side of the spark generator, wherein in a first position of non use of  
10     the lighter the flint is positioned below the spark wheel such that no or insufficient sparks are produced to ignite the lighter and a second position in which the flint is urged against the spark wheel so that sufficient sparks to ignite the lighter are generated when the spark wheel is rotated.
- 15     2     A gas lighter of the roll and press type, comprising a spark generator comprising a spark-wheel assembly and a flint mounted centrally at the top of the lighter, a burner mounted to one side of the spark generator, and a gas release lever extending from the burner to an operating portion on the opposite side of the spark generator, wherein the spark-wheel assembly is  
20     mounted for in and out movement and urged to its out position, and including flint holding means which normally grip the flint but release the flint in response to a downward force resulting from operation of the lighter.
- 3     A gas lighter of the roll and press type, comprising a spark generator  
25     comprising a spark-wheel assembly and a flint mounted centrally at the top of the lighter, a burner mounted to one side of the spark generator, and a gas release lever extending from the burner to an operating portion on the opposite side of the spark generator, wherein the spark-wheel assembly is mounted for in-and-out movement and urged to its out position, and wherein

in a first position of non use of the lighter, the flint held below the spark wheel such that no or insufficient sparks are produced to ignite the lighter and a second position in which the flint is released and urged against the spark wheel so that sufficient sparks to ignite the lighter are generated when the spark wheel is rotated.

4 A gas lighter according to any preceding claim, wherein the flint holding means is released by the downward movement of the spark-wheel assembly.

10

5 A gas lighter according to any preceding claim, wherein the flint holding means is released by the downward movement of the lever.

6 A gas lighter according to any preceding claim, wherein the spark wheel assembly is rotatably mounted on at least one upstanding support which support is a sprung support which urges the spark wheel assembly to its up position.

7 A gas lighter according to claim 6, wherein the support includes a sideways slot which provides the upwardly biased sprung support.

8 A gas lighter according to any preceding claim, wherein the flint holding means includes a plate-like member which comprises a hole through which the flint passes.

25

9 A gas lighter according to claim 8, wherein in a first position the plate-like member is arranged obliquely with respect to the axis of the flint so that the inside wall of the hole acts on the flint preventing its upward movement

and in a second position the plate-like member is arranged approximately orthogonally to the axis of the flint so that the flint slides freely in the hole.

10 A gas lighter according to claim 1 or 3, wherein the in and out  
5 positions of the spark wheel assembly are up and down respectively in relation to the body of the lighter when held upwardly.

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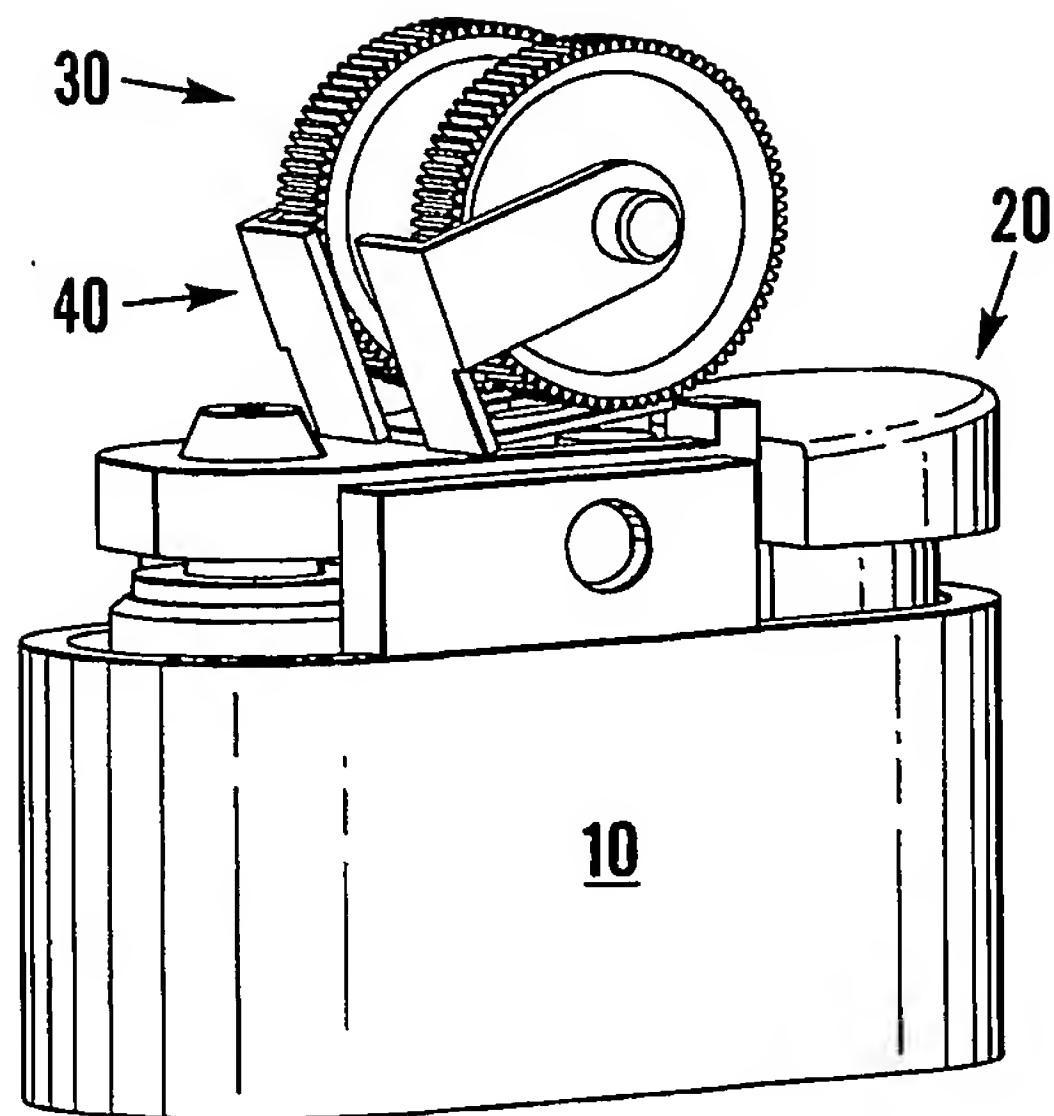


Fig. 1A

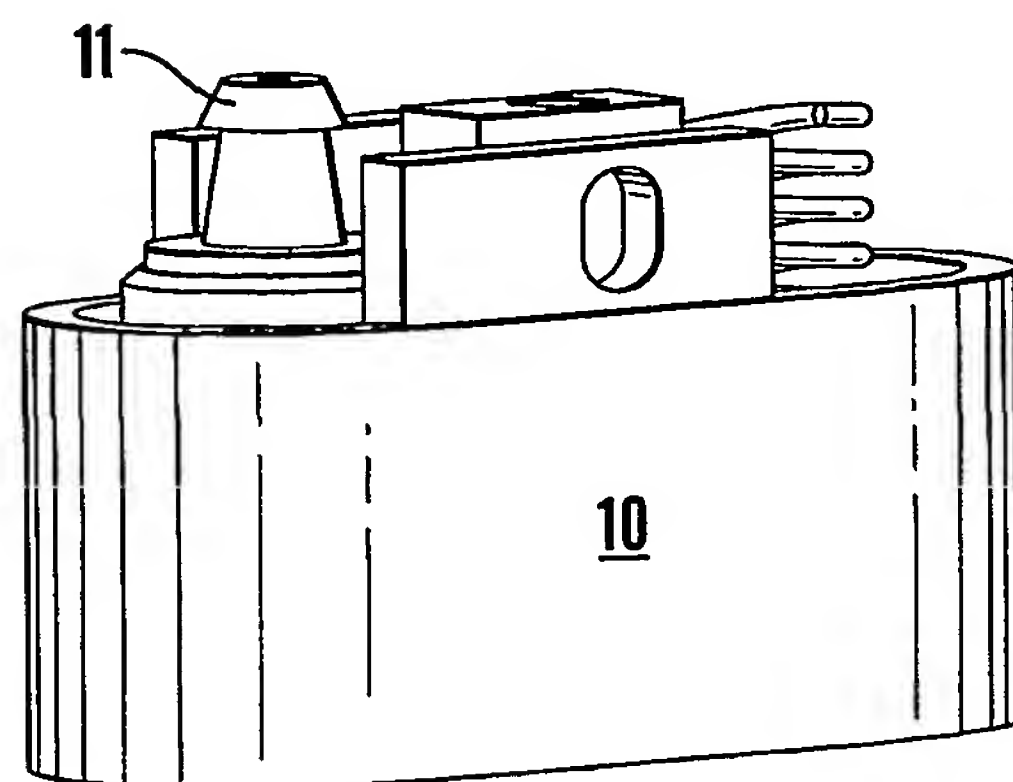
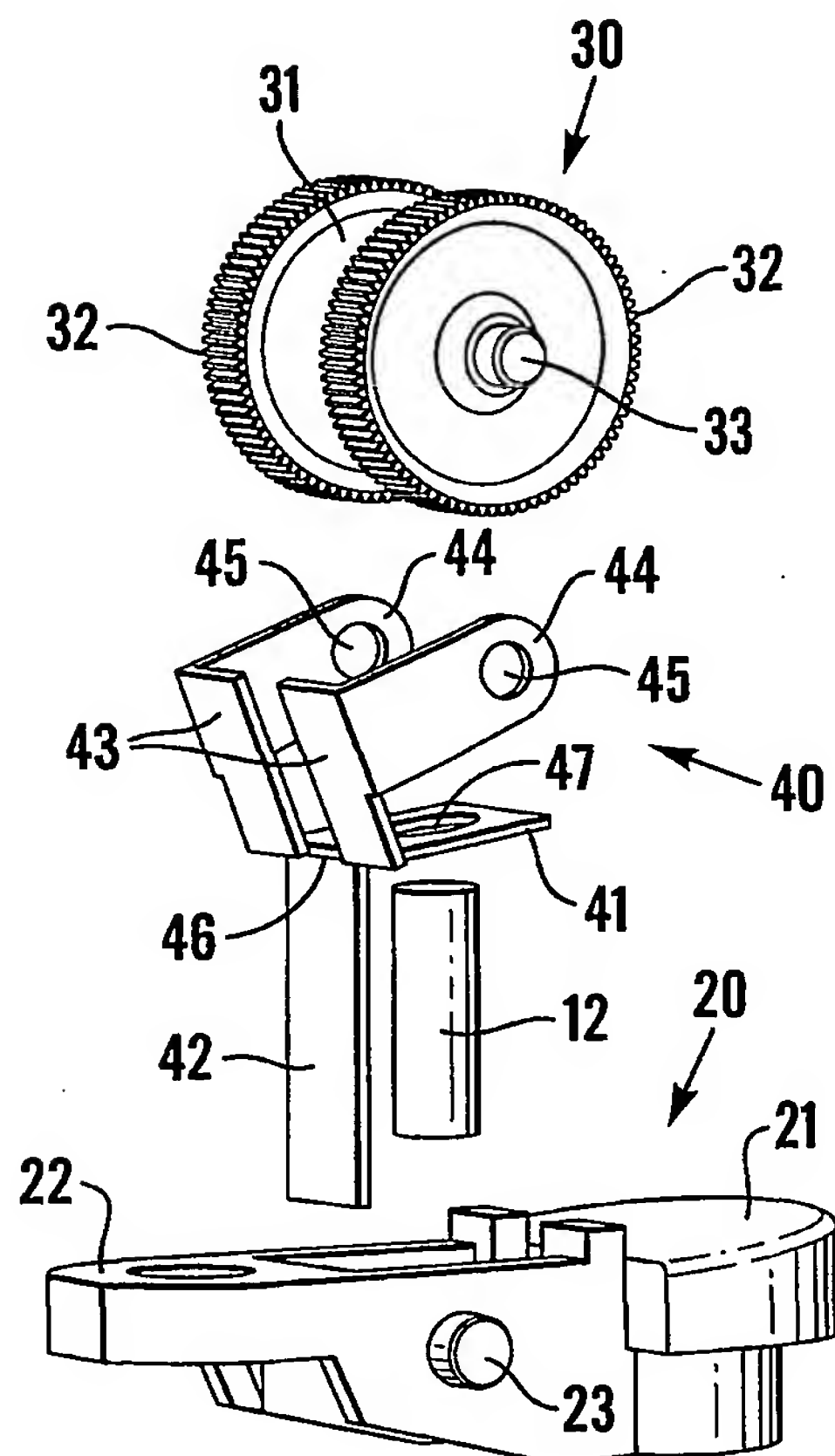


Fig. 1B



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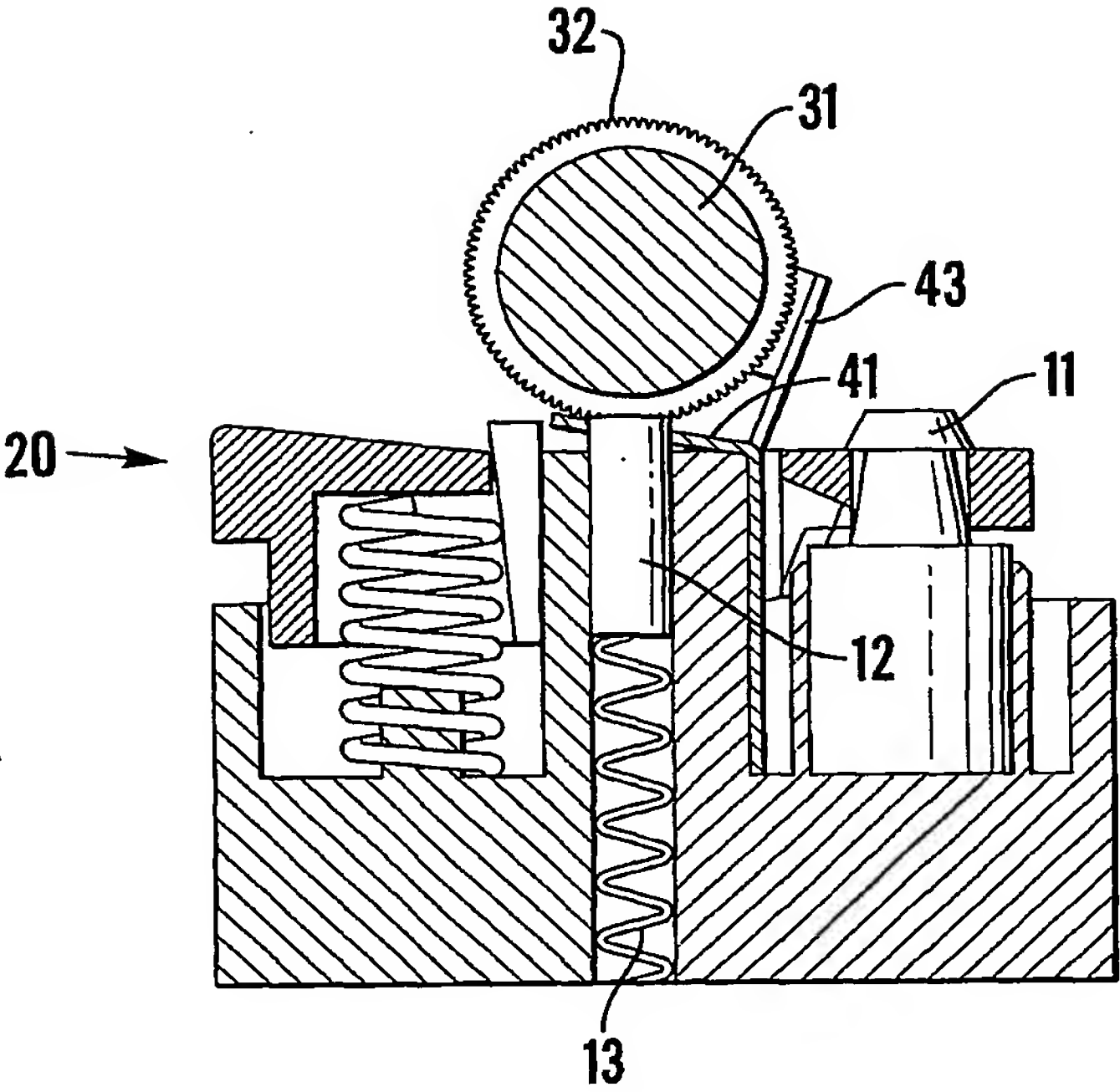


Fig. 2A

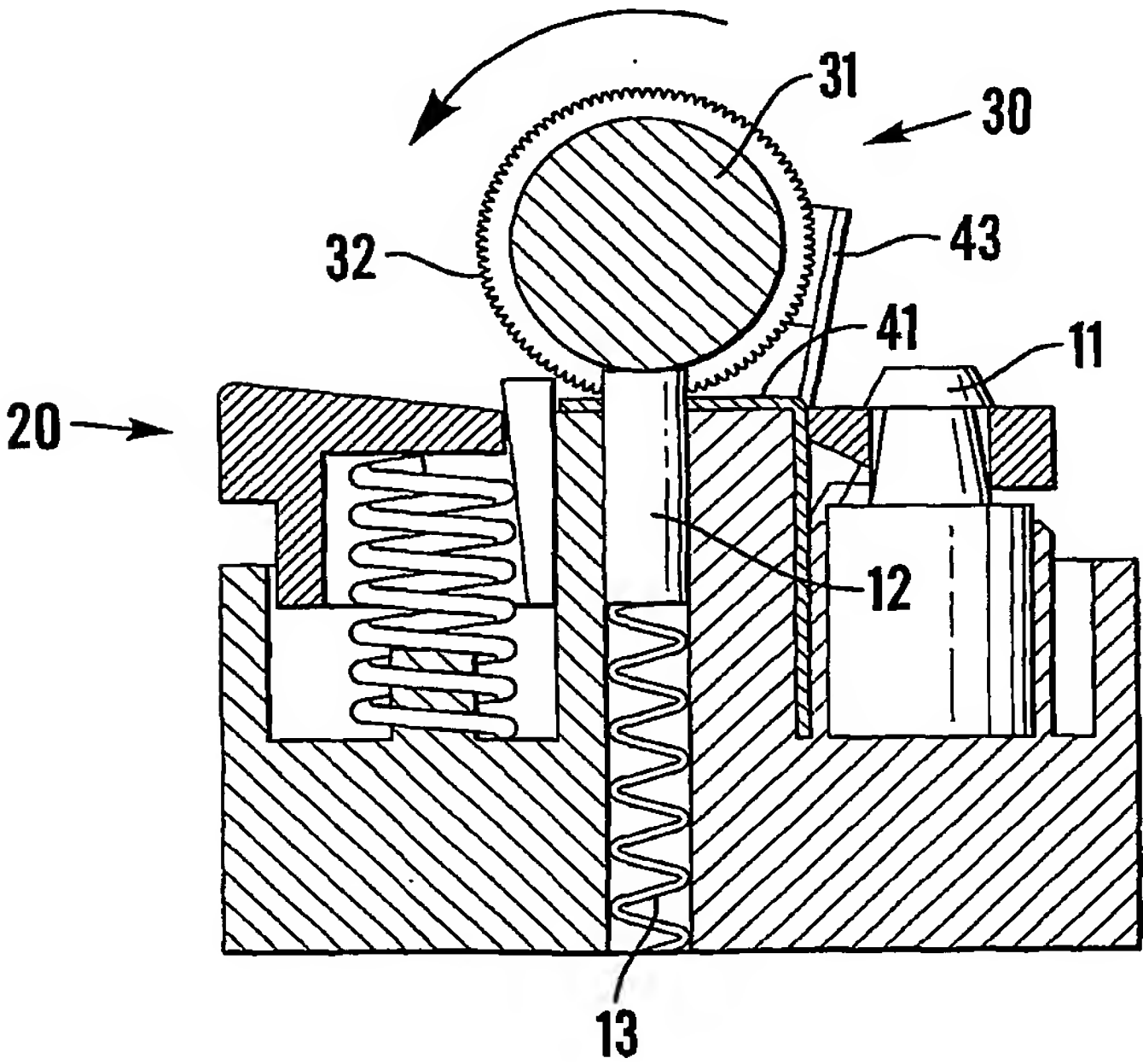


Fig. 2B

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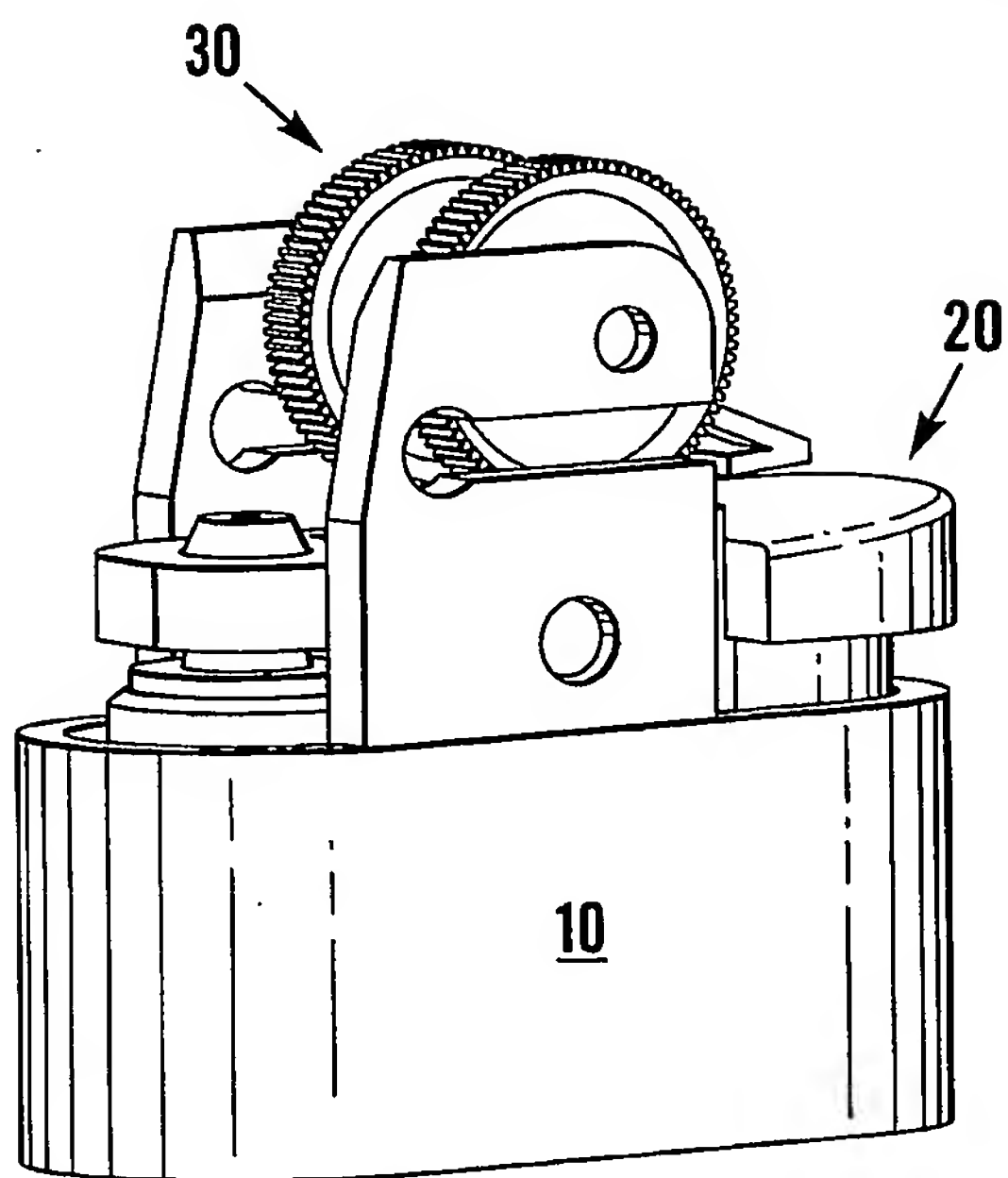


Fig. 3A

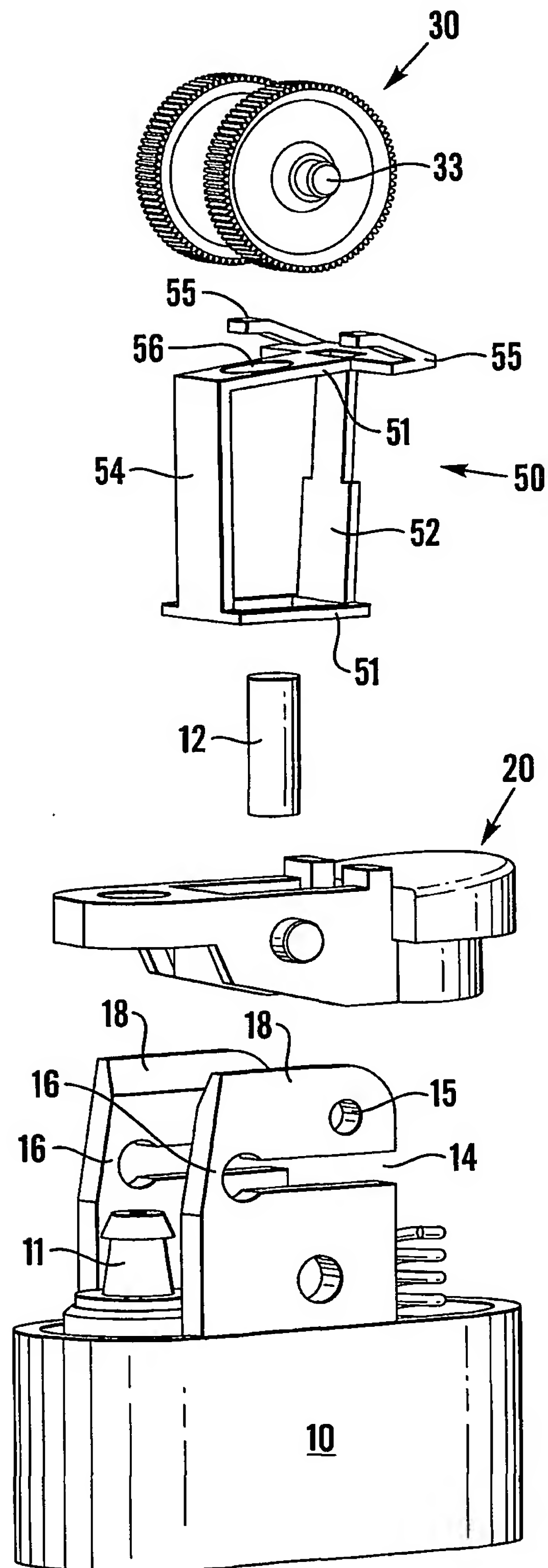


Fig. 3B

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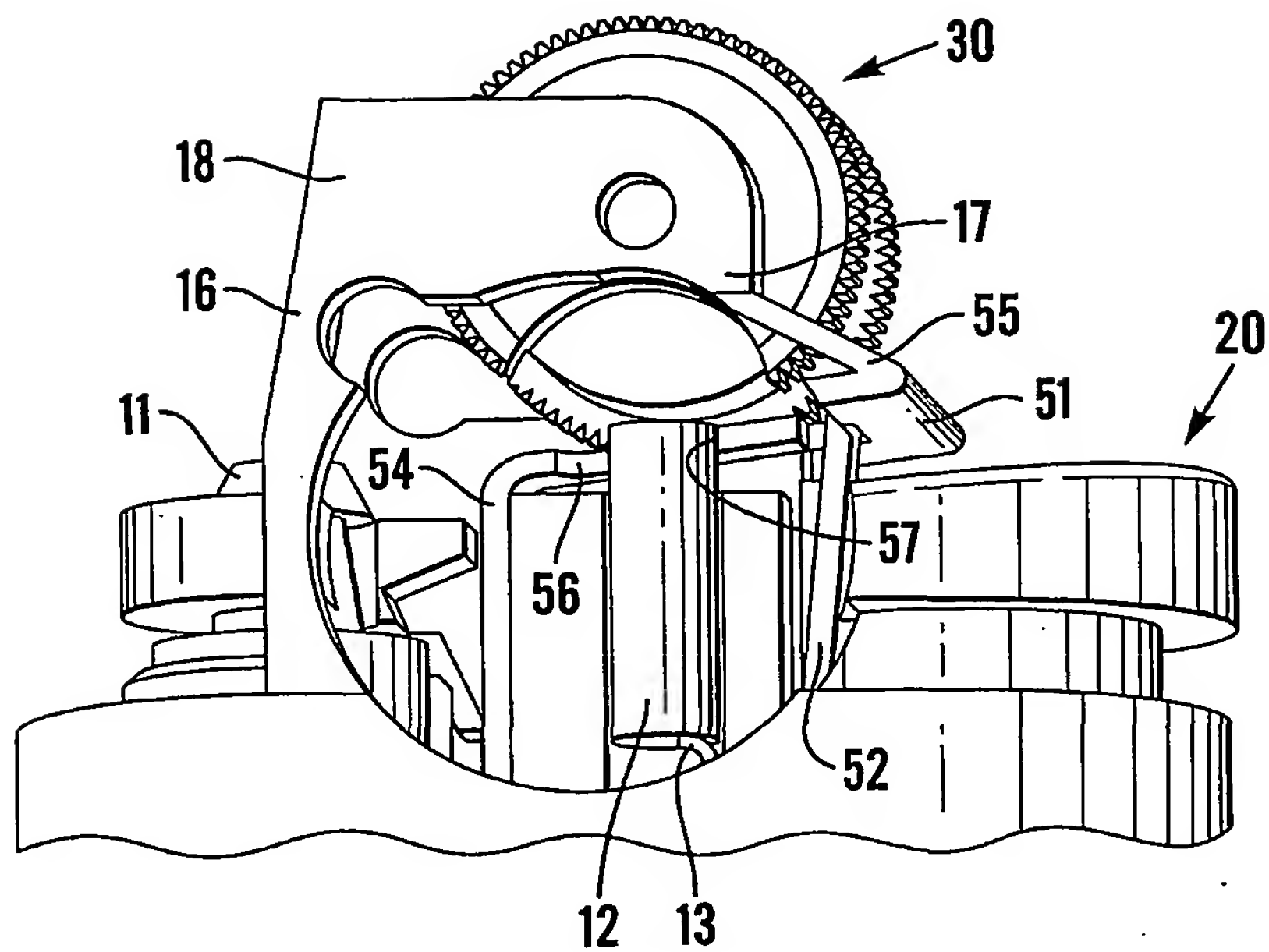


Fig. 4A

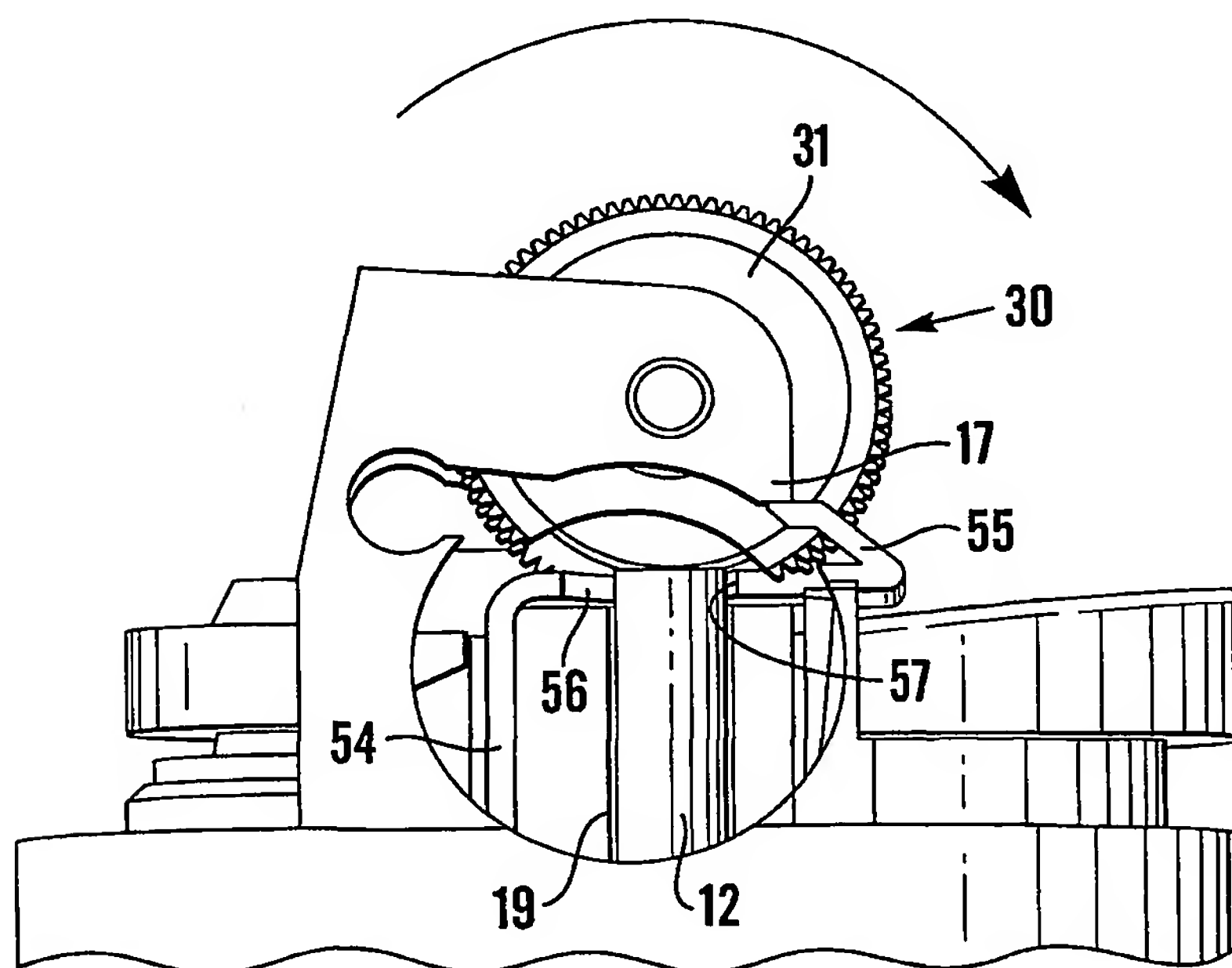


Fig. 4B

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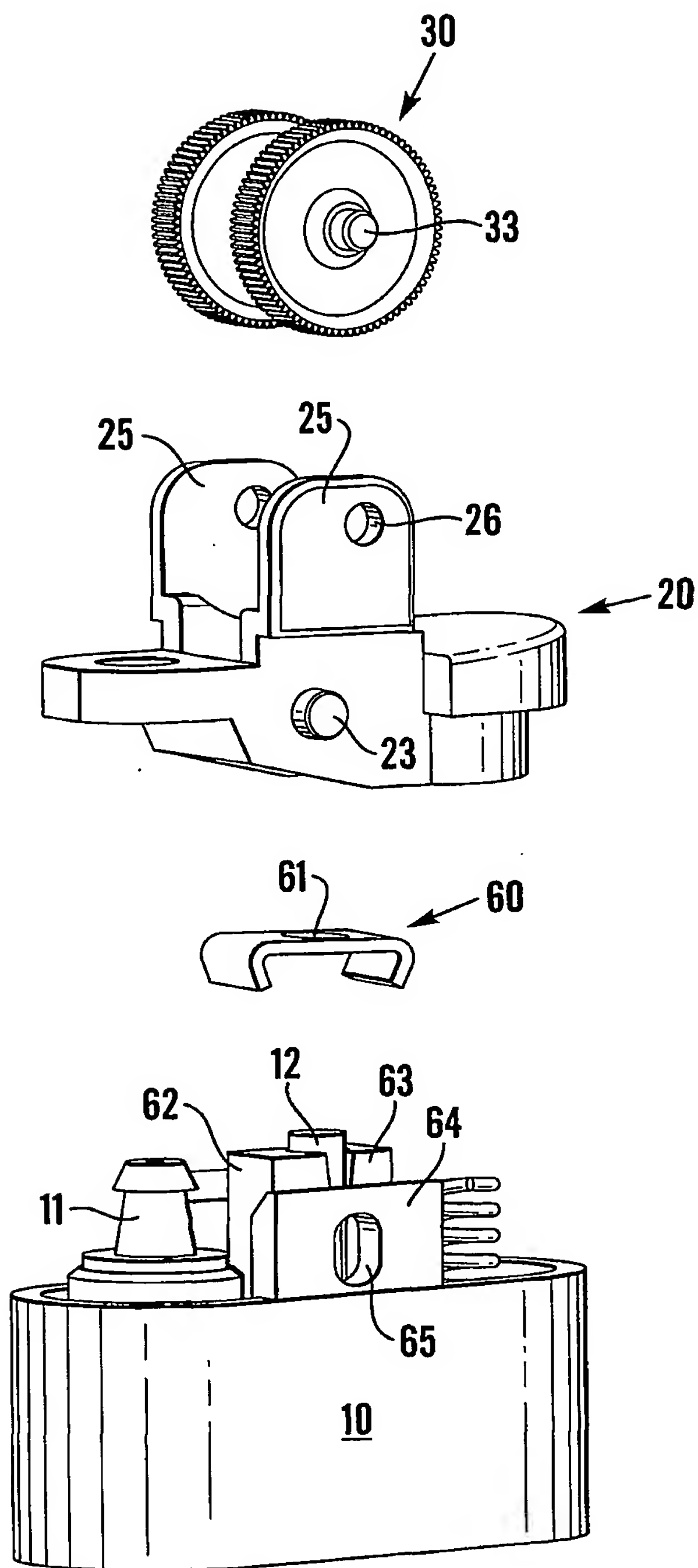


Fig.5

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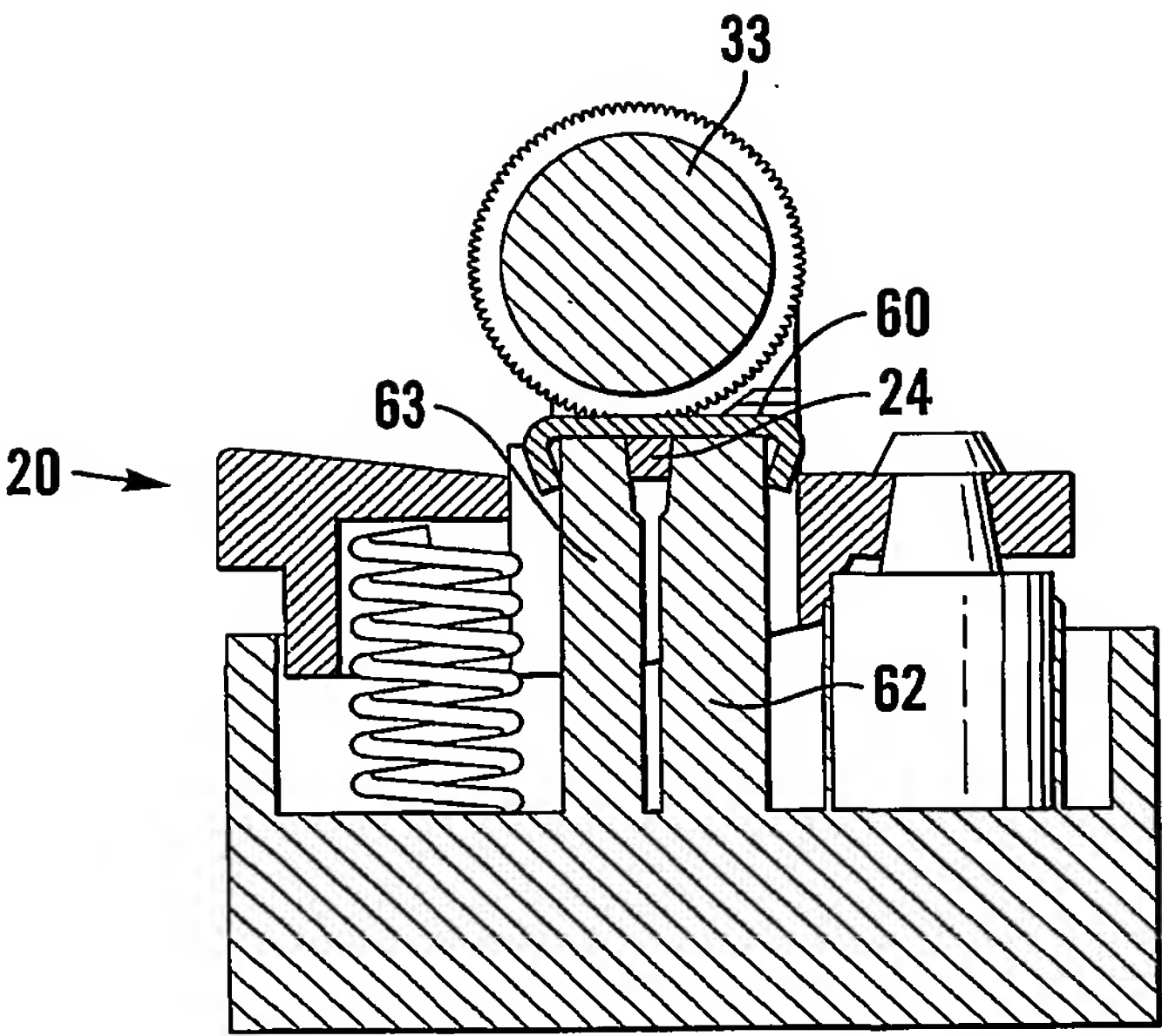


Fig.6A

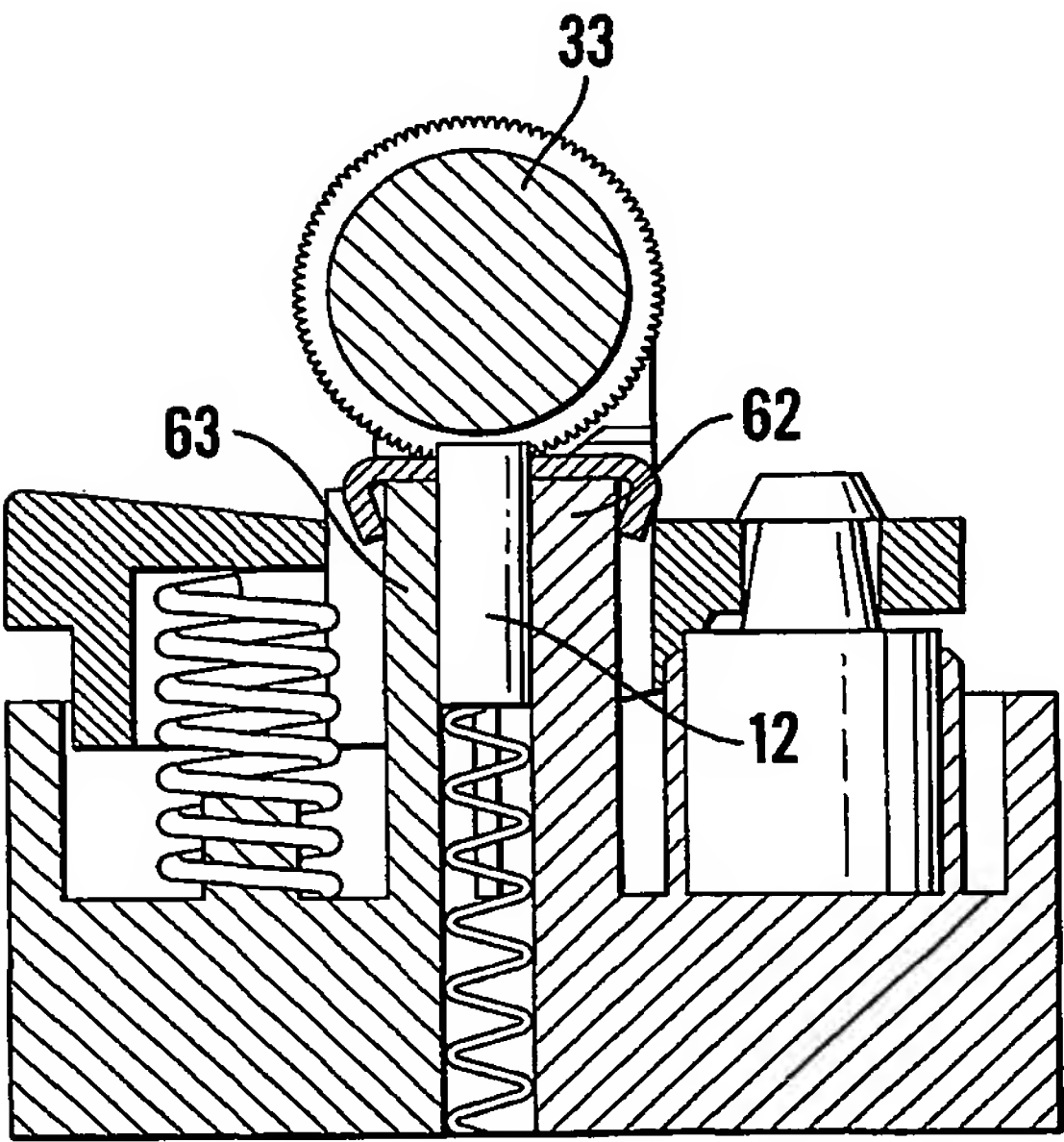


Fig.6B